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SECURITY INFORMATION  
CENTRAL INTELLIGENCE AGENCY  
INFORMATION FROM  
FOREIGN DOCUMENTS OR RADIO BROADCASTS

REPORT   
CD NO.

STAT

COUNTRY Yugoslavia  
SUBJECT Economic - Building materials, cement  
HOW PUBLISHED Monthly periodical, handbook, and books  
WHERE PUBLISHED Belgrade  
DATE PUBLISHED 1952 - 1953  
LANGUAGE Croatian

DATE OF INFORMATION 1931 - 1951  
DATE DIST. 24 Sep 1953  
NO. OF PAGES 10  
SUPPLEMENT TO REPORT NO.

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SOURCE Periodical, handbook, and books as indicated.

THE YUGOSLAV CEMENT INDUSTRY

The following report is mostly taken from Informativni prirucnik o Jugoslaviji (Information Handbook on Yugoslavia), Book 2, Sections 4-6, 1952, a handbook which has been issued in sections since late 1948 by the Yugoslav Directorate for Information.

Statistics for 1951 on exports and imports are taken from Statistika spoljne trgovine FNR Jugoslavije za 1951 godinu (Statistics on Yugoslav Foreign Trade for 1951); statistics for 1952 on exports and imports are taken from Statistika spoljne trgovine FNR Jugoslavije za 1952 godinu (Statistics on Yugoslav Foreign Trade for 1952); and statistics for 1952 production are taken from the July 1953 issue of Indeks, mesecni pregled privredne statistike FNR Jugoslavije (Index, Monthly Survey of the Economic Statistics of Yugoslavia).

The cement industry, one of Yugoslavia's oldest industries, has developed as follows:

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STATE		NAVY		NSRB		DISTRIBUTION									
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<u>Present Name of Enterprise</u>	<u>Location</u>	<u>Prevar Name of Enterprise</u>	<u>Date of Es- tablishment</u>
Beocinska fabrika cementa (Beocin Cement Plant)	Beocin	Beocinska fabrika cementa	1869
Cementarna (Cement Plant)	Trbovlje	T. P. D. cementarna	1877
Raljska fabrika cementa (Ralje Cement Plant)	Ralje	Raljska fabrika cementa	1899
"Prvoborac"	Solin	Ujedinjene tvornice cementa "Adria" Dalmacija	1904
"10 kolovoz"	Solin-Majdan	"Split" A. D. za cement portland	1908
Tvornica cementa "Sloboda" ("Sloboda" Cement Plant)	Podsused	Tvornica cementa "Croatia"	1908
Fabrika cementa (Cement Plant)	Popovac	Francuska-srpska industrija cementa	1909
"Renko Sperac" pogon A ("Renko Sperac" A Plant)	Ravnice-Omis	"Isvocat CO," Omic	1909
"Partizan"	Kastel Sucurac	--	1912
Tvornica portland cementa (Portland Cement Plant)	Livno	Tvornica portland cementa	1912
Tvornica cementa i salonita "15 septembar" ("15 September" Cement and Salonit Plant)	Ankovo	S. A. cementi Isontc	1922
Istarska tvornica cementa (Istrian Cement Plant)	Koromacno	S. P. Z. M. A.	1925
Tvornica portland i specijalnih cementa (Factory of Portland and Special Cements)	Pula	Societa Istriana del cemento	1926

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"Renko Sperac" B Plant	Ravnice-Omis	Tvornica cementa N. Palaversic	1932
Fabrika cementa "Sar" ("Sar" Cement Plant)	Kacanik	Fabrika cementa "Lepenac"	1936
Oblasna tvornica cementa (Oblast Cement Plant)	Split	--	1949

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In addition to the plants listed above which are in operation today, Yugoslavia had the following plants: Tvornica cementa Gilardi-Bettizza (The Gilardi-Bettizza Cement Plant) in Split, which was established in 1865; Tvornica cementa Dovje-Mojstrana (The Dovje-Mojstrana Cement Plant), which was established in 1896; Tvornica cementa (Cement Plant) in Zidani Most, which was established in 1896; Fabrika cementa (Cement Plant) in Ripanj, which was established in 1896; and Tvornica cementa (Cement Plant) in Bakar, which was established in 1910.

Cement Production

The best known raw materials are found along the Dalmatian coast and represent almost inexhaustible reserves for the cement industry. This was a determining factor in the construction of plants along the Dalmatian coast, which produce fine quality cement products known through the world as Dalmatian cement products.

Export and consumption of Yugoslav cement before World War II were as follows (in tons):

<u>Year</u>	<u>Domestic Consumption</u>	<u>Exports</u>	<u>Total</u>
1931	503,000	417,000	920,000
1932	333,000	332,000	665,000
1933	289,000	362,000	651,000
1934	250,000	434,000	684,000
1935	311,000	473,000	784,000
1936	315,000	307,000	618,000
1937	418,000	201,000	619,000
1938	515,000	197,000	712,000
1939	508,000	155,000	663,000

During 1940 - 1945, the cement industry operated chiefly with obsolete equipment, and military operations destroyed some facilities, thus lowering production considerably. Dalmatian plants suffered the most damage, namely, the "10 kolovoz" and Beocin plants.

In 1940, 600,000 tons of cement were produced; in 1941, 448,000 tons; in 1942, 549,000 tons; in 1943, 379,000 tons; and in 1944, 190,000 tons.

The following table compares the number and capacity of Yugoslav cement plants in 1951 with 1946. Also shown is the plan for increases by 1955.

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	1946*		1951		1955	
	No of Plants	Capacity After Reconstruction (1,000 tons)	No of Plants	Capacity (1,000 tons)	No of Plants	Capacity (1,000 tons)
Serbia	4	316	4	309	5	652
Croatia	6	470	8	830	8	1,130
Slovenia	2	162	2	235	2	245
Bosnia-Hercegovina	1	5	1	4	1	5
Macedonia	--	--	--	--	1	100
Yugoslavia	13	953	15	1,378	17	2,132

\* Includes capacities of cement plants in Pula, Koromacno, and Anhovo, which became a part of the Yugoslav cement industry in 1948.

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Most expansion work will be in Dalmatian plants because of the high quality raw materials available and the favorable geographical location for export. A cement plant with a planned annual capacity of 100,000 tons is under construction in Usje near Skoplje. The output of this plant should meet the needs of Macedonia and a part of southern Serbia. A plant, whose annual capacity is to be 180,000 tons, is under construction in Novi Popovac in Serbia. The long-range program calls for a large cement plant to be built in Bosnia-Herzegovina.

Raw material for the Yugoslav cement industry consists largely of natural marl, whose chemical composition is almost ideal for Portland cement.

Plants in the interior utilize chiefly limestone and marl. Marl deposits along the Dalmatian coast total more than 100 million tons. An analysis of four deposits shows the following content (in percent):

Silica ( $\text{SiO}_2$ )	14.07	14.00	14.00	14.00
Iron oxide ( $\text{Fe}_2\text{O}_3$ )	2.89	2.28	2.70	2.80
Alumina ( $\text{Al}_2\text{O}_3$ )	4.02	4.62	3.80	4.50
Lime ( $\text{CaO}$ )	42.41	41.75	43.60	42.50
Sulfuric anhydride ( $\text{SO}_3$ )	0.28	0.12	0.50	0.30
Magnesia ( $\text{MgO}$ )	1.10	1.48	1.80	1.14
Alkalies	0.30	0.25	0.50	0.56

Yugoslav cement is produced by one of two methods: (1) from natural stone or earth with the requisite chemical composition; or (2) from mixing raw materials, such as limestone, clay, chalky clay, or similar materials with artificial materials. Dalmatian plants produce cement directly from stone marl, while other factories use the second method. All cement plants obtain their raw materials from domestic quarries and clay pits.

The cement industry has changed over to using domestic coal in rotary kilns, and to some extent in vertical kilns without changing the quality of cement produced. Before World War II, imported high-quality coal was most widely used.

Cement production between 1945 and 1952 is shown as follows (1,000 tons):

	<u>1945</u>	<u>1946</u>	<u>1947</u>	<u>1948</u>	<u>1949</u>	<u>1950</u>	<u>1951</u>	<u>1952</u>
Serbia	34	191	330	270	273	258	228	277
Croatia	89	332	570	607	769	740	739	806
Slovenia	37	111	120	222	223	217	188	227
Bosnia-Herzegovina	--	2	3	3	3	4	4	3.3
Yugoslavia	160	636	1,023	1,122	1,268	1,219	1,159	1,313 <u>[sic]</u>

Note: The production of the Anzovo and Pula plants, which became a part of the Yugoslav cement industry after the annexation of Istria and the Slovenian Primorje, is included in the above figures from 1947 to 1951 [source did not indicate whether or not this production was included in the 1952 total]. The annual output of these two plants totaled 150,000 tons.

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The decreases in production in 1950 and 1951 resulted from the production of higher quality cement, which requires longer technological processing.

The technological equipment of Yugoslav cement plants makes it impossible to produce all types of cement, but the following types are produced today: Portland cement, high resistant Portland cement, Portland cement for road construction, Pozzolanic cement, Portland cement with granulated slag added, Portland cement for building massive dams, and fused cement (high-alumina or La Farge cement).

Yugoslav plants produce cement for export according to BSS and ASTM specifications.

Except for the Rajla plants, all plants are to be equipped to produce all high-quality cements but not all will be equipped to produce high-alumina cement.

Since Yugoslav cement plants are located mostly on the periphery of Yugoslavia, transportation costs to consumption areas are considerable. The consumption areas of some of the large plants are as follows:

<u>Plant</u>	<u>Consumption Area</u>
Beocin	Northern Serbia, the Vojvodina, and northern Bosnia
Popovac	Central, southern, and western Serbia; Bosnia-Herzegovina, and Macedonia
Sar	Southern Serbia, Macedonia
Sloboda	Northern Croatia, eastern Slovenia, and Bosnia-Herzegovina
Pula and Koromacno	Istria, Slovenia, and western Croatia
Dalmatian cement plants	Dalmatia, Bosnia south of Sarajevo, Lika, the islands, Montenegro, and abroad
Trbovlje	Slovenia, northern Croatia, and north-western Bosnia
Anhovo	Slovenia and northwestern Croatia

Cement is transported an average of over 300 kilometers. Plants are near raw materials deposits, rather than consumption areas. Future construction will take the latter factor into consideration, while construction of new railroads will reduce the distance between plant and consumption area.

#### Cement Exports

Before World War II, Yugoslav cement was exported as follows (in tons):

	<u>1935</u>	<u>1936</u>	<u>1937</u>	<u>1938</u>	<u>1939</u>
Europe	79,416	48,538	24,002	40,000	26,291
Asia	93,805	73,573	60,600	49,515	42,954
Africa	297,356	156,379	88,946	75,164	52,249

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	<u>1935</u>	<u>1936</u>	<u>1937</u>	<u>1938</u>	<u>1939</u>
North America	20	9,036	2,651	3,200	11,747
Central America	1,234	1,870	925	2,368	5,389
South America	705	13,944	20,417	26,993	16,131
Australia	--	--	--	12	--
Total	472,536	303,340	200,541 [sic]	197,252	154,761

The decrease in exports was the result of growing competition of cement plants abroad, increasing numbers of cement plants being built abroad, and increases in import duties abroad just before the war.

Before World War II, cement constituted 1.92 percent of all exports in 1935, 1.32 percent in 1936, 0.79 percent in 1937, 0.99 percent in 1938, and 0.84 percent in 1939.

After World War II, most of the foreign market was recaptured. Exports of cement have been as follows (in tons):

	<u>1947</u>	<u>1948</u>	<u>1949</u>	<u>1950</u>	<u>1951</u>
Europe	78,572	76,794	81,428	35,637	104,899
Asia	53,944	41,065	23,555	76,965	112,748
Africa	49,749	22,653	18,387	16,356	42,825
North America	--	--	2,268	--	185
South America	52,878	28,750	175,594	171,223	82,720
Total	235,143	169,262	305,232	300,181	343,477

Exports of Yugoslav Portland cement in 1951 and 1952 were as follows:

	<u>1951</u> <u>(100 kg)</u>	<u>1952</u> <u>(kg)</u>
Austria	89,686	337,500
Italy	1,200	33,350,085
Malta	161,950	5,625,000
Turkey	539,600	37,800,000
Trieste	--	356,000
Other European countries	4,400	--
Israel	310,120	3,174,000
Iran	--	3,500,000
Jordan	7,307	14,212,000

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	1951 (100 kg)	1952 (kg)
Cyprus	199,500	2,850,000
Syria	509,500	16,820,000
Arabia	300,550	19,450,000
British South Africa	48,000	--
British-Egyptian Sudan	--	13,200,000
Sudan	5,000	--
Egypt	260,000	--
Libya	94,650	2,400,000
Tunis	21,650	--
Other African countries	--	5,850,653
Argentina	434,695	35,990,000
Brazil	392,500	83,227,000
Paraguay	--	3,500,000
Total	3,380,308	281,642,238

Exports of white and aluminous cements in 1951 and 1952 were as follows:

	1951 (100 kg)	1952 (kg)
Austria	10,050	1,004,620
Italy	40,350	2,020,000
Netherlands	2,000	150,000
Trieste	250	--
US	1,850	150,000
Total	54,500	3,324,620

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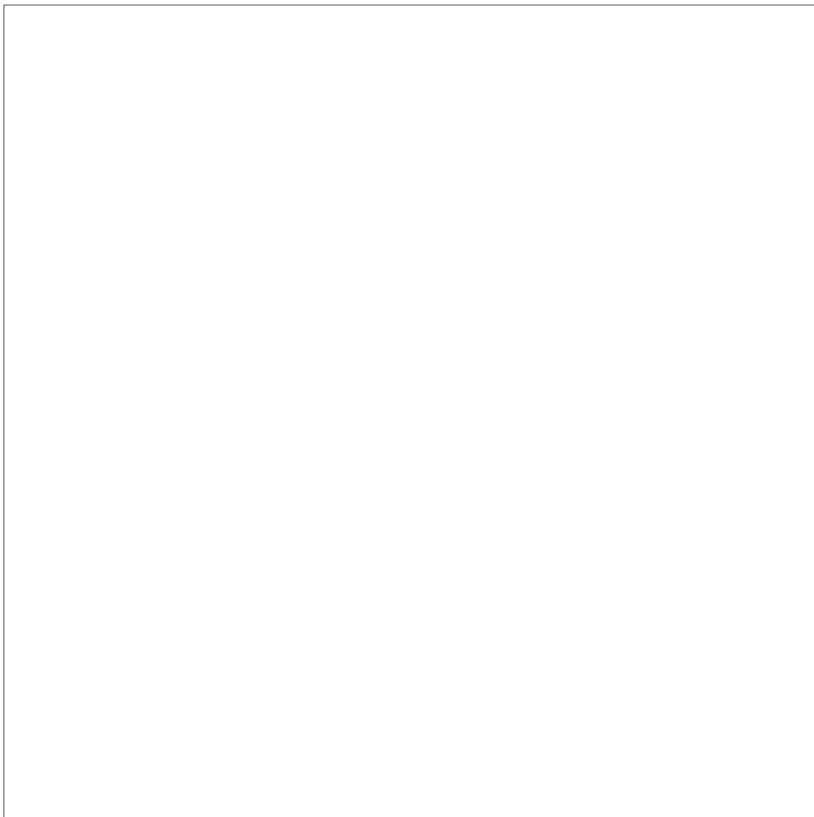
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Exports of other cements in 1952 were as follows:

	1952 (kg)
Italy	592,000
Argentina	5,000,000
Total	5,592,000



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